ASRTU SPECIFICATION FOR HR 20/30 ALUMINIUM BLIND RIVET (Break Mandrel, MULTIGRIP TYPE)

SPECIFICATION NO.: AS:448:77:SEP:2011

1.0 SCOPE:

1.1 This standard prescribes dimensions, lab testing for break mandrel aluminium alloy blind rivets Multigrip type suitable for road vehicle body building.

This is a purchase specification and does not include manufacturing details. The parts/material supplied against this specification shall be compatible with the original equipment.

The supplier shall provide detail drawings and specifications to the purchasing/ inspecting authority whenever such information is specifically called for.

The material offered against this specification shall conform to this specification in full. The tests shall be carried out on the part directly or on the specimen prepared from the components. If any of the samples fail in any one or more tests specified, the sample shall be considered as not having met the requirements of this specification.

It is the manufacturer's prime responsibility to satisfy the inspection authority that the commodity conforms to this standard. This may be accomplished by performing the tests specified in this standard.

Sample selection shall be the responsibility of the Quality Assurance Officer. Required quantity for complete testing as per this specification shall be supplied.

2.0 APPLICATION:

2.1 This specification covers the requirements for Aluminium (HR 20/30) Blind Rivet Multigrip type used during building/repairing of Passenger Bus Bodies.

3.0 REFERENCE STANDARDS:

3.1 Considerable assistance has been taken of the following specification

1. IS 733:1983 : Specification for Wrought Aluminium & Aluminium Alloy Bars, Rods and Section for General Engineering Purpose
2. SAE J 1200 : Specification for Break Mandrel Blind Rivets.
3. IFI 110:1969 : Glossary of terms relating to Blind Rivets.
4. IFI 114:1970 : Standard for Break Mandrel Blind Rivets.
5. ASM Handbook Vol 2 : Properties and selection :Non-ferrous alloys and Special Purpose material

4.0 DEFINITIONS:

4.1 Multigrip Blind Rivet:

Multigrip blind rivet is a blind fastener which has a self-contained mechanical and other feature which permits the formation of an upset on the blind end of the rivet and expansion of the rivet shank during rivet setting to join the component parts of an assembly by formation of washer type expansion. These are pull mandrel blind rivets where during the setting operation the mandrel is pulled into or against the rivet body and breaks at or near the junction of the mandrel shank and upset at end.

5.0 REQUIREMENTS:

5.1 Mandrel Break Load:

Mandrel Break load is defined as the axial load required to break the mandrel at the weak portion when rivet is being set. This load is required between 3340 - 4670 N

5.2 Mandrel Retention:

The mandrel shall be retained within the rivet body such that a force in excess of 1 kg is required to reduce the mandrel protrusion to its specified minimum. The load required for this displacing the mandrel from the rivet body is mandrel retention load. This test can be carried out with the help of fixture as elaborated in figure 1. This load shall be 1kg minimum.

5.3 Rivet Styles:

Two basic styles of break mandrel blind rivets are designated.

a) Protruding head type (Commonly known as round head type)
b) Flush head type (120 counter-sunk head)

6.0 MATERIAL:

Rivet Body material shall be made of aluminium alloys
Alloy 65032 (HR 20) / Alloy 64430 (HR 30) As per IS: 740-1977

and shall be such to ensure that the rivet meet mechanical and performance requirement as specified in this specification.
The mandrel shall be made of Carbon Steel and shall meet the mechanical and performance requirements as specified in this specification.

7.0 LABORATORY TEST & REQUIREMENTS:

7.1 **Dimensional Inspection:** The dimensional inspection of rivets will ensure that the supplied material meets the dimensional requirements, which are maintained between the specified parameters of figure 2. The dimension of the rivets shall be as per Table 2 & 3 according to the head shape required by the purchaser. The recommended length of the rivet will be selected as per Table 4.

7.2 **Open Riveting Test:** The rivet is squeezed in open condition (without any stack in between) with the help of riveting gun (Lazy tong or Pneumatic type) till the mandrel breaks. The mandrel shall not protrude out of the rivet head after complete squeezing and breaking. The formation of the riveted end shall be multigrip type as elaborated in figure 3. The rivet body shall not tear while squeezing and washer like formation diameter shall be 7.00 mm minimum.

7.3 The mandrel of the rivet shall be phosphate /plated suitably for rust prevention

7.4 **Shear Test:** The test shall be comprised of loading a single lap joint assembled with one rivet so that the direction of the applied load includes transverse shear against the rivet body. The test specimen shall be mounted in tensile testing machine having least count of 1 kg. capable of applying load in a controllable rate. The grips shall be self-aligning and care shall be taken when mounting the specimen to ensure that the load will be transmitted in the straight line through the test rivet.

The test plate thickness shall be varied as per table 1 given below depending upon rivet length. The design of test plates shown in figure 4. The plate shall be alloy steel quenched and tempered to a hardness of Rockwell 46-50 Rc.Minimum . Shear Load shall be 1160 N (Min).

7.5 **Tensile Test** : The test shall be comprised of separation of two plate joint with blind rivet. The test rivet shall be installed in a test fixture as shown in fig.5 (or suitable alternate test fixture) and the breaking load in tension per rivet shall be 1420N (min)

8.0 PACKING

8.1 Rivet shall be packed in polyurethene bag in such a way that they are prevented from rust and mechanical damage during transit.

TABLE -1

Dimensions Of Test Plate For Shear Test And Tensile Test

RIVET LENGTH in mm	TEST PLATE THICKNESS (T) in mm for Shear Test	TEST PLATE THICKNESS (T) in mm for Tensile Test
25.00/25.50	9.00 x 2 Plates	3.00 x 2 plates
19.00/19.50	6.00 x 2 Plates	
16.50/17.00	5.00 x 2 Plates	
12.50/13.00	3.00 x 2 Plates	

TABLE -2

Round Head Blind Rivets – Fig 1(a)

Parameters	Size1 (mm)	Size2(mm)	Size3 (Inches)
Shank Diameter	4.85-5.00	4.65-4.85	3/16
R max	0.70mm	0.70 mm	0.025
Head Diameter	9.00 - 10.00	9.04 - 10.01	0.356 - 0.394
Head Thickness	1.50 (nomi)	1.52	0.060
Eccentricity of Head a-b	0.30mm	0.30mm	0.012
Remote End Taper of Rivet e	0.4mm Max	0.4mm Max	0.016 Max
Mandrel Diameter	2.55/2.90	2.90 (nomi)	0.114 (nomi)
Mandrel Protrusion	27mm Min	27mm Min	1.06 Min
Gap Between Mandrel Head &Rivet End-c	2mm Max	2mm Max	0.08 Max
Drill size to be used in component	5.10mm	4.9mm	No.11

TABLE -3

Counter Sunk (120° angle) Head Blind Rivets – Fig 1(b)

Parameters		Size1 (mm)	Size2 (mm)	Size3(Inches)
Shank Diameter		4.85-5.00	4.65-4.85	3/16
R max		0.30mm	0.90mm	0.035
Head Diameter		8.50-9.15	8.51-9.17	0.335 – 0.361
Head Thickness		1.50 (nomi)	1.27	0.050
Eccentricity of Head	a-b	0.30mm	0.30mm	0.012
Remote End Taper of Rivet	e	0.4mm Max	0.4mm Max	0.016 Max
Mandrel Diameter		2.55/2.90	2.90 (nomi)	0.114 (nomi)
Mandrel Protrusion		27mm Min	27mm Min	1.06 Min
Gap Between Mandrel Head & Rivet End	c	2mm Max	2mm Max	0.08 Max
Drill size to be used in component		5.10mm	4.9mm	No.11

TABLE -4

Recommended Lengths for Multigrip Type Blind Rivets:

RIVET LENGTH (L)		STACK THICKNESS/GRIP RANGE (G)	
MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
12.50	13.00	1.50	6.00
16.50	17.00	1.50	10.00
19.00	19.50	1.50	12.00
25.00	25.50	12.00	18.00

WEIGHTAGE MARKS FOR ALUMINIUM BLIND RIVETS (MULTIGRIP TYPE)

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Sr. No.	Properties	Clause No.	Marks Allotted	P/T
1	Mandrel Breaking load	5.1	6	P
2	Mandrel Retention load	5.2	6	T
3	Material	6.0	20	T
4	Dimensional Checking			
	Shank dia	7.1	5	T
	Length of Mandrel Outside Rivet Head		5	T
	Rivet Head dia		5	T
5	Open Riveting test (Multigrip type formation)			
	Washer type Formation	7.2	3	T
	Tearing of Rivet		3	T
	Mandrel Protuding Out of Rivet Head		3	T
	Mandrel Rust Preventive Coating	7.3	3	T
7	Shear load	7.4	20	P
8	Tensile load	7.5	20	P
9	Packing	8.0	1	T
		Total	100	

P = Proportionate marks shall be considered.

T = Total marks shall be considered.

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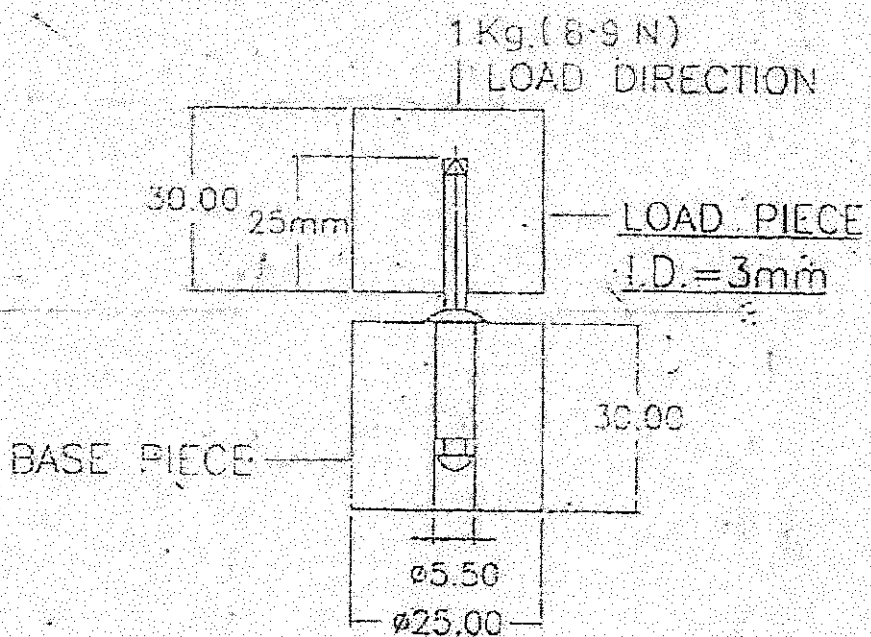

TEST FIXTURE FOR
MANDREL RETENTION LOAD TEST

ALL INSPECTION TOLERANCES TO BE CONSIDERED AS ±0.1

MANDREL RETENSION TEST FIXTURE

ALL DIMNS. ARE IN MM.

C . I . R . T . (I & R) PUNE-26.			
FIG. 1			
DRN	CHD	APPD	DRAWING NO.
S. MEHER 31-7-2002			S-048-03 SHEET 1 OF 5

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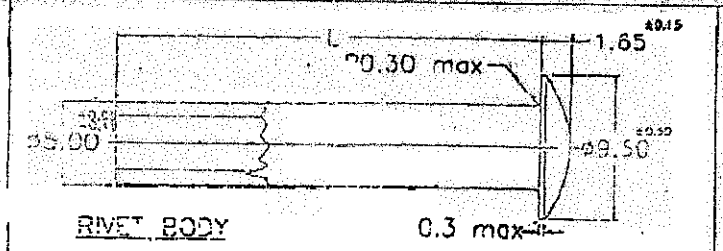
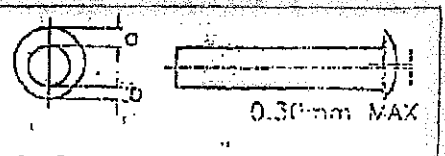
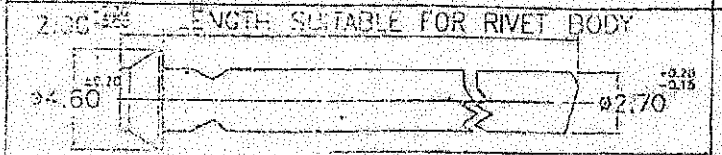
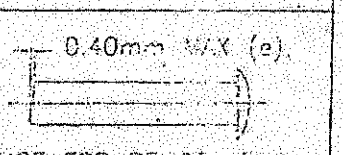


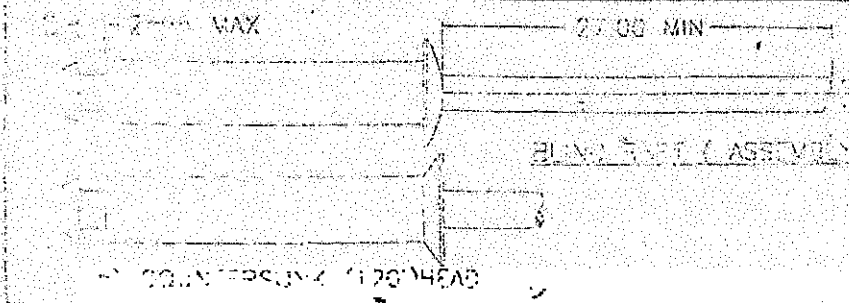


TOLERANCE FOR ECCENTRICITY OF HEAD WITH RESPECT TO RIVET SHANK





TOLERANCE FOR REMOVAL OF TAPER OF RIVET



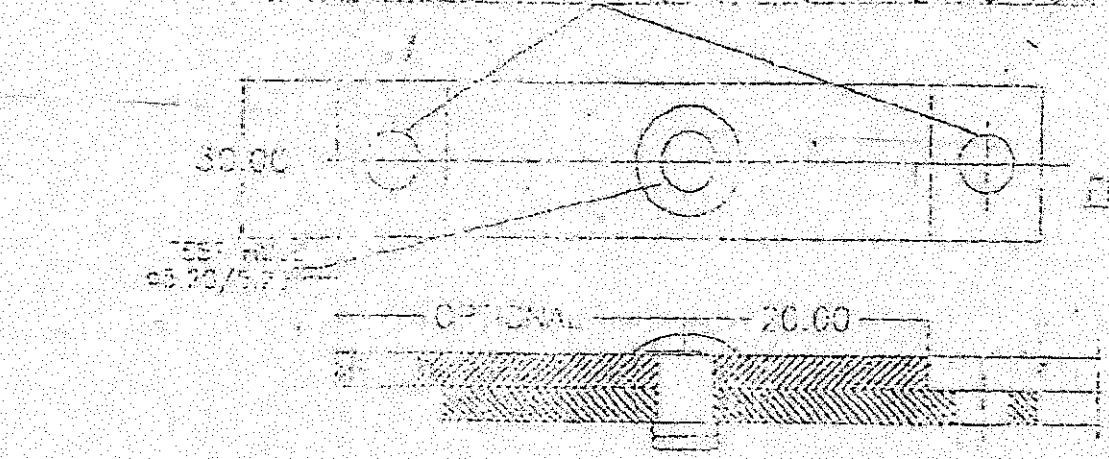
ALL DIMNS. ARE IN MM

BLIND RIVETS

C.I.R.T. (T & R) PE-26			
FIG. 2			
DRN	CHD	APPD	DRAWING NO.
S.MEHER 31-7-2002			S-048-00 SHEET 2 OF 5

TEST PLATES FOR SHEAR JIGS

OPTIONAL HOLES OR PIN TYPE WORKING IN A TESTING MACHINE



EDGES TO BE COUNTERED WITH RADIUS 1 mm

ENLARGED VIEW OF TEST PLATE

UNSPECIFIED TOLERANCES TO BE CONSIDERED AS ±0.05

UNIT mm

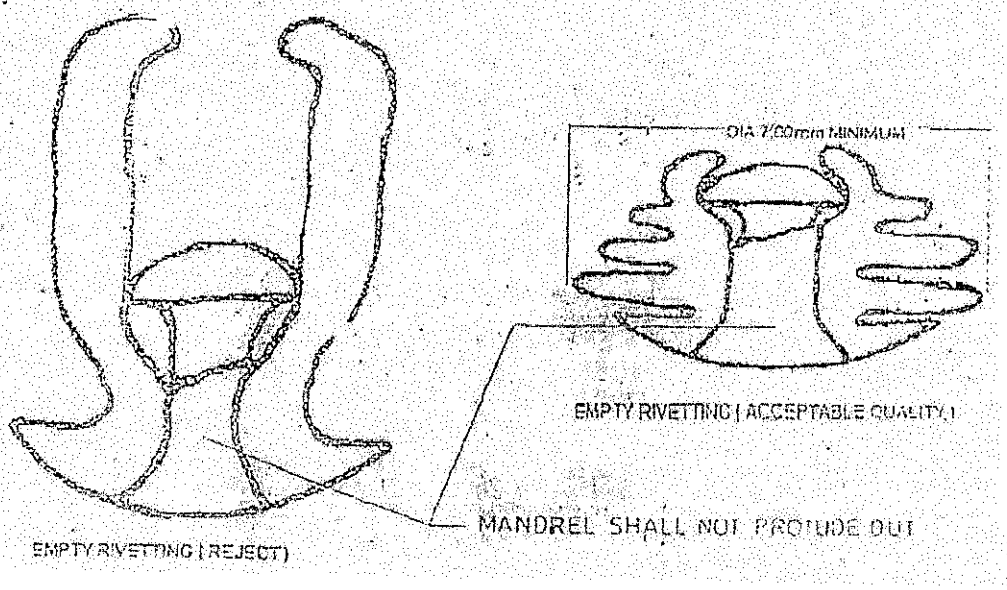
RIVET LENGTH	TEST PLATE THICKNESS(T)
23.00 / 25.50	9.00 x 2 PLATES
18.00 / 19.50	6.00 x 2 PLATES
16.50 / 17.00	3.00 x 2 PLATES
12.50 / 13.00	3.00 x 2 PLATES

MATERIAL : O.H.N.S.
HARDNESS : 50~55 Rc

DRAWING FOR TEST PROCEDURE

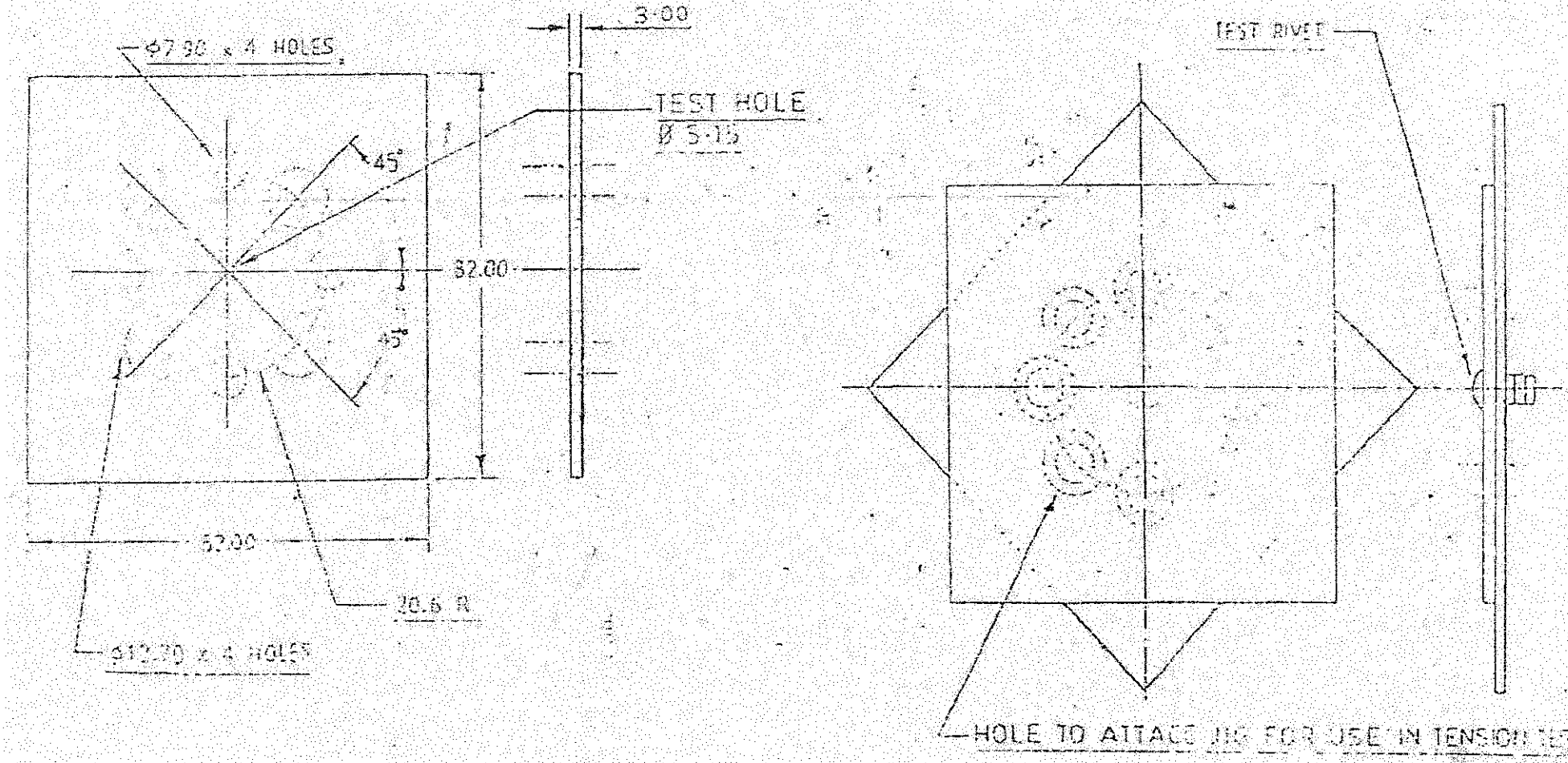
ALL DIMENSIONS ARE IN MM.

C . I . R . T . (T & R) PUNE-26.			
FIG 4			
DRN	CHD	APPD	DRAWING NO.
S.MEHER 01-8-2002			S-048-04 SHEET 4 OF 5



OPEN RIVETING TEST

C . I . R . I . (T & R) PUNE-26.			
FIG.3			
DRN	CHD	APPD	DRAWING NO.
S.MEHER 31-7-2007			S-048-02 SHEET 3 OF 5



DIMENSIONAL DETAILS OF TEST PLATE FOR TENSILE TESTING

ALL DIMNS. ARE IN MM

C . I . R . T . (T & R) PUNE-26			
FIG. 5			
DRN	CHD	APPD	DRAWING NO.
S. MEHER 01-8-2002			S-048-05 SHEET 5 OF 5